

1 1. Method of structurally converting a binary sequence into an encrypted final image
2 G , the structural conversion comprising the steps of:
3
4 forming an image M of the binary sequence as a concatenation of a tag data
5 element T and structural data element S , tag data element T comprising
6 information necessary to reverse a conversion process, structural data element S
7 comprising a sequence of logical scales of position coding;
8
9 selecting a number of conversion function iterations P to be performed;
10
11 iteratively executing P times a conversion function comprised of the following
12 steps:
13 selecting a transformation algorithm A from a predefined set of
14 transformation algorithms L ;
15 selecting an alphabet of transformation AV based upon the structural data
16 element S ;
17 applying algorithm A and alphabet AV to structural data element S to form
18 a plurality of logical scales of position coding;
19 forming a transformed structural data element S' comprised of a sequence
20 of the logical scales of position coding;
21 selecting an external key K^x ;
22 forming tag data element T ;
23 coding the tag data element T with external key K^x to obtain coded tag
24 data element T'' ;
25 repeating the steps of the conversion function upon a converted image M'
26 comprised of a concatenation of the coded tag data element T'' and
27 the transformed structural data element S' ;
28
29 and forming the encrypted final image G as a concatenation of the coded tag data
30 element T'' and the transformed structural data element S' created upon the P^{th}

1 iteration of the conversion function.

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3 2. Method of structurally converting a binary sequence into an encrypted final image

4 G , said structural conversion comprising the steps of:

5

6 forming an image M of the binary sequence as a concatenation of a tag data

7 element T and structural data element S , tag data element T comprising

8 information necessary to reverse the conversion process, structural data element S

9 comprising a sequence of logical scales of position coding;

10

11 selecting a number of conversion function iterations P to be performed;

12

13 iteratively executing P times a conversion function comprised of the following

14 steps:

15 selecting a transformation algorithm A from a predefined set of

16 transformation algorithms L ;

17 selecting an alphabet of transformation AV based upon the structural data

18 element S ;

19 applying algorithm A and alphabet AV to structural data element S to form

20 a plurality of logical scales of position coding;

21 forming a transformed structural data element S' comprised of a sequence

22 of the logical scales of position coding;

23 stochastically selecting a bit length parameter and a shift parameter which

24 define an internal identifier K within transformed structural data

25 element S' ;

26 forming tag data element T ;

27 coding a portion of the tag data element T with internal identifier K to

28 obtain a partially coded tag data element T' ;

29 selecting an external key K^x ;

30 coding the partially coded tag data element T' with external key K^x to

1 obtain coded tag data element T'' ;
 2 determining whether to extract internal identifier K from
 3 transformed structural data element S' , and if determined
 4 necessary, extracting the internal identifier K from transformed
 5 structural data element S' to obtain structural data element S'' and
 6 storing internal identifier K in a file of internal identifiers FID ;
 7 repeating the steps of the conversion function upon a converted image M'
 8 comprised of a concatenation of the coded tag data element T'' and
 9 either transformed structural data element S' if internal identifier K
 10 was not extracted, or structural data element S'' if internal identifier
 11 K was extracted;

12
 13 and forming the encrypted final image G as a concatenation of the coded tag
 14 data element T'' and either transformed structural data element S' if internal
 15 identifier K was not extracted, or structural data element S'' if internal
 16 identifier K was extracted.

17
 18 3. Method of structurally converting a binary sequence into an encrypted final image
 19 G , said structural conversion comprising the steps of:

20
 21 forming an image M of the binary sequence as a concatenation of a tag data
 22 element T and structural data element S , tag data element T comprising
 23 information necessary to reverse the conversion process, structural data element S
 24 comprising a sequence of logical scales of position coding;

25
 26 selecting a number of conversion function iterations P to be performed;

27
 28 iteratively executing P times a conversion function comprised of the following
 29 steps:

30 selecting a transformation algorithm A from a predefined set of

1 transformation algorithms L ;
2 selecting an alphabet of transformation AV based upon the structural data
3 element S ;
4 applying algorithm A and alphabet AV to structural data element S to form
5 a plurality of logical scales of position coding;
6 forming a transformed structural data element S' comprised of a sequence
7 of the logical scales of position coding;
8 stochastically selecting a bit length parameter and a shift parameter which
9 define an internal identifier K within transformed structural data
10 element S' ;
11 scrambling internal identifier K with a scrambling function to obtain a
12 scrambled internal identifier K' ;
13 forming tag data element T ;
14 coding a portion of the tag data element T with scrambled internal
15 identifier K' to obtain a partially coded tag data element T' ;
16 selecting an external key K^x ;
17 coding the partially coded tag data element T' with external key K^x to
18 obtain coded tag data element T'' ;
19 determining whether to extract internal identifier K from
20 transformed structural data element S' , and if determined
21 necessary, extracting the internal identifier K from transformed
22 structural data element S' to obtain structural data element S'' and
23 storing scrambled internal identifier K' in a file of internal
24 identifiers FID ;
25 repeating the steps of the conversion function upon a converted image M'
26 comprised of a concatenation of the coded tag data element T'' and
27 either transformed structural data element S' if internal identifier K
28 was not extracted, or structural data element S'' if internal
29 identifier K was extracted;
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1 and forming the encrypted final image G as a concatenation of the coded tag data
2 element T'' and either transformed structural data element S' if internal identifier
3 K was not extracted, or structural data element S'' if internal identifier K was
4 extracted.

5
6 4. The method of claim 2, further comprising the steps of:

7
8 structurally converting the file of internal identifiers FID to obtain a converted file
9 of internal identifiers FID' , wherein a tag data element formed during the
10 structural conversion of the file of internal identifiers FID is coded with an
11 external key selected stochastically from a multitude of external keys in an
12 external key file K_{EXT} ; and

13
14 optionally transmitting the encrypted final image G and structurally converted file
15 of internal identifiers FID' to a subscriber or receiver.

16
17 5. The method of claim 1, wherein the external key K^x is selected from a multitude
18 of external keys in an external key file K_{EXT} .

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20 6. The method of claim 1, wherein the selection of external key K^x is a stochastic
21 selection.

22
23 7. The method of claim 1, wherein a same external key K^x is selected for use in all
24 iterations.

25
26 8. The method of claim 1, wherein a different external key K^x is selected upon each
27 iteration.

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29 9. The method of claim 1, wherein the external key K^x is entered by a user during the
30 conversion and reverse conversion process.

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10. The method of claim 5, further comprising the steps of:
- structurally converting the external key file K_{EXT} to obtain a structurally converted external key file; and
- transmitting to a subscriber the structurally converted external key file and an initial key K_{INIT} required to reverse the structural conversion of the structurally converted external key file to obtain the external key file K_{EXT} .
11. The method of claim 1, wherein the selection of transformation algorithm A may be a stochastic selection.
12. The method of claim 1, wherein the selection of transformation algorithm A may depend upon adherence to a mathematical criterion.
13. The method of claim 1, wherein the selection of transformation algorithm A may depend upon adherence to a logical criterion.
14. The method of claim 1, wherein the selection of transformation algorithm A may depend upon adherence to a file size criteria for encrypted final image G .
15. The method of claim 1, wherein the predefined set of transformation algorithms L may be supplemented.
16. The method of claim 1, wherein the selection of a number of conversion steps P may be a stochastic selection.
17. The method of claim 1, wherein the selection of a number of conversion steps P may depend upon adherence to a mathematical criterion.

- 1 18. The method of claim 1, wherein the selection of a number of conversion steps P
2 may depend upon adherence to a logical criterion.
3
- 4 19. The method of claim 1, wherein the selection of a number of conversion steps P
5 may depend upon adherence to a file size criteria for encrypted final image G .
6
- 7 20. The method of claim 1, wherein the alphabet of transformation AV is comprised
8 of letters or quants, each letter or quant comprising a segment of structural data
9 element S .
10
- 11 21. The method of claim 2, further comprising the step of determining upon which
12 iterations, if any, internal identifiers are to be extracted.
13
- 14 22. The method of claim 3, further comprising the step of determining upon which
15 iterations, if any, internal identifiers are to be extracted.
16
- 17 23. The method of claim 20, wherein a number of bits in each letter or quant is
18 stochastically selected.
19
- 20 24. The method of claim 20, wherein a number of bits in each letter or quant may
21 depend upon adherence to a mathematical criterion.
22
- 23 25. The method of claim 20, wherein a number of bits in each letter or quant may
24 depend upon adherence to a logical criterion.
25
- 26 26. The method of claim 20, wherein a number of bits in each letter or quant may
27 depend upon adherence to a file size criteria for encrypted final image G .
28

1 27. The method of claim 1, wherein the information necessary to reverse the
2 conversion process stored in tag data element T may comprise one or more of the
3 following:

4
5 an indicator of whether a current iterative step is the P^{th} iteration;

6
7 an indicator of whether the selected external key K^x is to be used for all P
8 iterations;

9 an indicator of the selected external key K^x ;

10
11 an indicator of the selected transformation algorithm A ;

12
13 a length of a first logical scale of position coding;

14 an indicator of user information;

15
16 the alphabet of transformation AV ; and

17
18 other transformation algorithm A parameters.
19

20 28. The method of claim 2, wherein the information necessary to reverse the
21 conversion process stored in tag data element T may comprise one or more of the
22 following:

23
24 an indicator of whether a current iterative step is the P^{th} iteration;

25
26 an indicator of whether the selected external key K^x is to be used for all P
27 iterations;

28
29 an indicator of the selected external key K^x ;
30

1 an indicator of the selected transformation algorithm A ;
2 an indicator of user information;
3
4 the alphabet of transformation AV ;
5
6 a length of a first logical scale of position coding;
7
8 other transformation algorithm A parameters;
9
10 the bit internal identifier K length and shift parameters; and
11 an indicator of internal identifier K extraction.
12

13 29. The method of claim 3, wherein the information necessary to reverse the
14 conversion process stored in tag data element T may comprise one or more of the
15 following:
16

17 an indicator of whether a current iterative step is the P^{th} iteration;
18

19 an indicator of whether the selected external key K^x is to be used for all P
20 iterations;
21

22 an indicator of the selected external key K^x ;
23

24 an indicator of the selected transformation algorithm A ;
25 an indicator of user information;
26

27 the alphabet of transformation AV ;
28

29 a length of a first logical scale of position coding;
30

- 1 other transformation algorithm A parameters;
2
3 an indicator of the scrambling function selected;
4
5 the bit internal identifier K length and shift parameters; and
6
7 an indicator of internal identifier K extraction.
8
- 9 30. The method of claim 3, wherein the scrambling function is selected from a
10 scrambling matrix comprised of a predefined set of scrambling functions.
11
- 12 31. The method of claim 30, wherein the predefined set of scrambling functions is
13 changed periodically.
14
- 15 32. The method of claim 1, wherein the conversion function further comprises the
16 step of:
17 determining whether to insert user information into structural data element S , and
18 inserting user information into structural data element S if determined necessary,
19 thereby providing a means for user authentication and digital signing.
20
- 21 33. The method of claim 2, wherein the conversion function further comprises the
22 step of:
23 determining whether to insert user information into structural data element S , and
24 inserting user information into structural data element S if determined necessary,
25 thereby providing a means for user authentication and digital signing.
26
- 27 34. The method of claim 3, wherein the conversion function further comprises the
28 step of:

1 determining whether to insert user information into structural data element S , and
2 inserting user information into structural data element S if determined necessary,
3 thereby providing a means for user authentication and digital signing.
4

5 35. Computer executable process steps stored on a computer readable medium, the
6 computer executable process steps for structurally converting a binary sequence
7 into an encrypted final image G , the computer executable process steps
8 comprising:
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10 forming an image M of the binary sequence as a concatenation of a tag data
11 element T and structural data element S , tag data element T comprising
12 information necessary to reverse a conversion process, structural data element S
13 comprising a sequence of logical scales of position coding;
14

15 selecting a number of conversion steps P to be performed;
16

17 iteratively executing P times a conversion function comprised of the following
18 steps:
19 selecting a transformation algorithm A from a predefined set of
20 transformation algorithms L ;
21 selecting an alphabet of transformation AV based upon the structural data
22 element S ;
23 applying algorithm A and alphabet AV to structural data element S to form
24 a plurality of logical scales of position coding;
25 forming a transformed structural data element S' comprised of a sequence
26 of the logical scales of position coding;
27 selecting an external key K^x ;
28 forming tag data element T ;
29 coding the tag data element T with external key K^x to obtain coded tag
30 data element T'' ;

1 repeating the steps of the conversion function upon a converted image M'
 2 comprised of a concatenation of the coded tag data element T'' and the
 3 transformed structural data element S' ;
 4
 5 and forming the encrypted final image G as a concatenation of the coded tag data
 6 element T'' and the transformed structural data element S' created upon the P^{th}
 7 iteration of the conversion function.
 8
 9 36. Computer executable process steps stored on a computer readable medium, the
 10 computer executable process steps for structurally converting a binary sequence
 11 into an encrypted final image G , the computer executable process steps
 12 comprising:
 13
 14 forming an image M of the binary sequence as a concatenation of a tag data
 15 element T and structural data element S , tag data element T comprising
 16 information necessary to reverse the conversion process, structural data element S
 17 comprising a sequence of logical scales of position coding;
 18
 19 selecting a number of conversion steps P to be performed;
 20
 21 iteratively executing P times a conversion function comprised of the following
 22 steps:
 23 selecting a transformation algorithm A from a predefined set of
 24 transformation algorithms L ;
 25 selecting an alphabet of transformation AV based upon the structural data
 26 element S ;
 27 applying algorithm A and alphabet AV to structural data element S to form
 28 a plurality of logical scales of position coding;
 29 forming a transformed structural data element S' comprised of a sequence
 30 of the logical scales of position coding;

1 stochastically selecting a bit length parameter and a shift parameter which
 2 define an internal identifier K within transformed structural data
 3 element S' ;
 4 forming tag data element T ;
 5 coding a portion of the tag data element T with internal identifier K to
 6 obtain a partially coded tag data element T' ;
 7 selecting an external key K^x ;
 8 coding the partially coded tag data element T' with external key K^x to
 9 obtain coded tag data element T'' ;
 10 stochastically determining whether to extract internal identifier K from
 11 transformed structural data element S' , and if determined
 12 necessary, extracting the internal identifier K from transformed
 13 structural data element S' to obtain structural data element S'' and
 14 storing internal identifier K in a file of internal identifiers FID ;
 15 performing the steps of the conversion function upon a converted image
 16 M' comprised of a concatenation of the coded tag data element T''
 17 and either transformed structural data element S' if internal
 18 identifier K was not extracted, or structural data element S'' if
 19 internal identifier K was extracted;
 20
 21 and forming the encrypted final image G as a concatenation of the coded tag data
 22 element T'' and either transformed structural data element S' if internal identifier
 23 K was not extracted, or structural data element S'' if internal identifier K was
 24 extracted.
 25
 26 37. Computer executable process steps stored on a computer readable medium, the
 27 computer executable process steps for structurally converting a binary sequence
 28 into an encrypted final image G , the computer executable process steps
 29 comprising:
 30

1 forming an image M of the binary sequence as a concatenation of a tag data
 2 element T and structural data element S , tag data element T comprising
 3 information necessary to reverse the conversion process, structural data element S
 4 comprising a sequence of logical scales of position coding;
 5
 6 selecting a number of conversion steps P to be performed;
 7
 8 iteratively executing P times a conversion function comprised of the following
 9 steps:
 10 selecting a transformation algorithm A from a predefined set of
 11 transformation algorithms L ;
 12 selecting an alphabet of transformation AV based upon the structural data
 13 element S ;
 14 applying algorithm A and alphabet AV to structural data element S to form
 15 a plurality of logical scales of position coding;
 16 forming a transformed structural data element S' comprised of a sequence
 17 of the logical scales of position coding;
 18 stochastically selecting a bit length parameter and a shift parameter which
 19 define an internal identifier K within transformed structural data
 20 element S' ;
 21 scrambling internal identifier K with a scrambling function to obtain a
 22 scrambled internal identifier K' ;
 23 forming tag data element T ;
 24 coding a portion of the tag data element T with scrambled internal
 25 identifier K' to obtain a partially coded tag data element T' ;
 26 selecting an external key K^x ;
 27 coding the partially coded tag data element T' with external key K^x to
 28 obtain coded tag data element T'' ;
 29 stochastically determining whether to extract internal identifier K from
 30 transformed structural data element S' , and if determined

1 necessary, extracting the internal identifier K from transformed
 2 structural data element S' to obtain structural data element S'' and
 3 storing scrambled internal identifier K' in a file of internal
 4 identifiers FID ;
 5 performing the steps of the conversion function upon a converted image
 6 M' comprised of a concatenation of the coded tag data element T''
 7 and either transformed structural data element S' if internal
 8 identifier K was not extracted, or structural data element S'' if
 9 internal identifier K was extracted;

10
 11 and forming the encrypted final image G as a concatenation of the coded tag data
 12 element T'' and either transformed structural data element S' if internal identifier
 13 K was not extracted, or structural data element S'' if internal identifier K was
 14 extracted.

15
 16 38. The computer executable process steps stored on a computer readable medium of
 17 claim 35, wherein the external key K^x is selected from a multitude of external
 18 keys in an external key file K_{EXT} .

19
 20 39. The computer executable process steps stored on a computer readable medium of
 21 claim 35, wherein the selection of the external key K^x is a stochastic selection.

22
 23 40. The computer executable process steps stored on a computer readable medium of
 24 claim 35, wherein a same external key K^x is selected for use in all iterations.

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 26 41. The computer executable process steps stored on a computer readable medium of
 27 claim 35, wherein a different external key K^x is selected upon each iteration.

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- 1 42. The computer executable process steps stored on a computer readable medium of
2 claim 35, wherein the external key K^x is entered by a user during the conversion
3 and reverse conversion process.
4
- 5 43. The computer executable process steps stored on a computer readable medium of
6 claim 35, wherein the selection of transformation algorithm A may be a stochastic
7 selection.
8
- 9 44. The computer executable process steps stored on a computer readable medium of
10 claim 35, wherein the selection of transformation algorithm A may depend upon
11 adherence to a mathematical criterion.
12
- 13 45. The computer executable process steps stored on a computer readable medium of
14 claim 35, wherein the selection of transformation algorithm A may depend upon
15 adherence to a logical criterion.
16
- 17 46. The computer executable process steps stored on a computer readable medium of
18 claim 35, wherein the selection of transformation algorithm A may depend upon
19 adherence to a file size criteria for encrypted final image G .
20
- 21 47. The computer executable process steps stored on a computer readable medium of
22 claim 35, wherein the predefined set of transformation algorithms L may be
23 supplemented.
24
- 25 48. The computer executable process steps stored on a computer readable medium of
26 claim 35, wherein the selection of a number of conversion steps P may be a
27 stochastic selection.
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- 1 49. The computer executable process steps stored on a computer readable medium of
2 claim 35, wherein the selection of a number of conversion steps P may depend
3 upon adherence to a mathematical criterion.
4
- 5 50. The computer executable process steps stored on a computer readable medium of
6 claim 35, wherein the selection of a number of conversion steps P may depend
7 upon adherence to a logical criterion.
8
- 9 51. The computer executable process steps stored on a computer readable medium of
10 claim 35, wherein the selection of a number of conversion steps P may depend
11 upon adherence to a file size criteria for encrypted final image G .
12
- 13 52. The computer executable process steps stored on a computer readable medium of
14 claim 35, wherein the alphabet of transformation AV is comprised of letters or
15 quants, each letter or quant comprising a segment of structural data element S .
16
- 17 53. The computer executable process steps stored on a computer readable medium of
18 claim 52, wherein a number of bits in each letter or quant is stochastically
19 selected.
20
- 21 54. The computer executable process steps stored on a computer readable medium of
22 claim 52, wherein a number of bits in each letter or quant may depend upon
23 adherence to a mathematical criterion.
24
- 25 55. The computer executable process steps stored on a computer readable medium of
26 claim 52, wherein a number of bits in each letter or quant may depend upon
27 adherence to a logical criterion.
28

- 1 56. The computer executable process steps stored on a computer readable medium of
2 claim 52, wherein a number of bits in each letter or quant may depend upon
3 adherence to a file size criteria for encrypted final image G .
4
- 5 57. The computer executable process steps stored on a computer readable medium of
6 claim 35, wherein the information necessary to reverse the conversion process
7 stored in tag data element T may comprise one or more of the following:
8 an indicator of whether a current iterative step is the P^{th} iteration;
9 an indicator of whether the selected external key K^x is to be used for all P
10 iterations;
11 an indicator of the selected external key K^x ;
12 an indicator of the selected transformation algorithm A ;
13 a length of a first logical scale of position coding;
14 the alphabet of transformation AV ; and
15 other transformation algorithm A parameters.
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- 17 58. The computer executable process steps stored on a computer readable medium of
18 claim 36, wherein the information necessary to reverse the conversion process
19 stored in tag data element T may comprise one or more of the following:
20 an indicator of whether a current iterative step is the P^{th} iteration;
21 an indicator of whether the selected external key K^x is to be used for all P
22 iterations;
23 an indicator of the selected external key K^x ;
24 an indicator of the selected transformation algorithm A ;
25 the alphabet of transformation AV ;
26 a length of a first logical scale of position coding;
27 other transformation algorithm A parameters;
28 internal identifier K bit length and shift parameters; and
29 an indicator of internal identifier K extraction.
30

- 1 59. The computer executable process steps stored on a computer readable medium of
2 claim 37, wherein the information necessary to reverse the conversion process
3 stored in tag data element T may comprise one or more of the following:
4 an indicator of whether a current iterative step is the P^{th} iteration;
5 an indicator of whether the selected external key K^x is to be used for all P
6 iterations;
7 an indicator of the selected external key K^x ;
8 an indicator of the selected transformation algorithm A ;
9 the alphabet of transformation AV ;
10 a length of a first logical scale of position coding;
11 other transformation algorithm A parameters;
12 an indicator of the scrambling function selected;
13 internal identifier K bit length and shift parameters; and
14 an indicator of internal identifier K extraction.
15
16 60. The computer executable process steps stored on a computer readable medium of
17 claim 37, wherein the scrambling function is selected from a scrambling matrix
18 comprised of a predefined set of scrambling functions.
19
20 61. The computer executable process steps stored on a computer readable medium of
21 claim 60, wherein the predefined set of scrambling functions is changed
22 periodically.
23
24 62. An apparatus for structurally converting a binary sequence into an encrypted final
25 image G , comprising:
26
27 a memory element for storing computer executable process steps;
28
29 a processor for executing computer executable process steps;
30

1 computer executable process steps comprising:

2

3 forming an image M of the binary sequence as a concatenation of a tag

4 data element T and structural data element S , tag data element T

5 comprising information necessary to reverse a conversion process,

6 structural data element S comprising a sequence of logical scales of

7 position coding;

8

9 selecting a number of conversion steps P to be performed;

10

11 iteratively executing P times a conversion function comprised of the

12 following steps:

13 selecting a transformation algorithm A from a predefined set of

14 transformation algorithms L ;

15 selecting an alphabet of transformation AV based upon the

16 structural data element S ;

17 applying algorithm A and alphabet AV to structural data element S

18 to form a plurality of logical scales of position coding;

19 forming a transformed structural data element S' comprised of a

20 sequence of the logical scales of position coding;

21 selecting an external key K^x ;

22 forming tag data element T ;

23 coding the tag data element T with external key K^x to obtain coded

24 tag data element T'' ;

25 repeating the steps of the conversion function upon a converted

26 image M' comprised of a concatenation of the coded tag

27 data element T'' and the transformed structural data element

28 S' ;

1 and forming the encrypted final image G as a concatenation of the coded
2 tag data element T'' and the transformed structural data element S' created
3 upon the P^{th} iteration of the conversion function.

4
5 63. An apparatus for structurally converting a binary sequence into an encrypted final
6 image G , comprising:

7
8 a memory element for storing computer executable process steps;

9
10 a processor for executing computer executable process steps;

11
12 computer executable process steps comprising:

13 forming an image M of the binary sequence as a concatenation of a tag
14 data element T and structural data element S , tag data element T
15 comprising information necessary to reverse the conversion process,
16 structural data element S comprising a sequence of logical scales of
17 position coding;
18 selecting a number of conversion steps P to be performed;

19
20 iteratively executing P times a conversion function comprised of the
21 following steps:

22 selecting a transformation algorithm A from a predefined set of
23 transformation algorithms L ;

24 selecting an alphabet of transformation AV based upon the
25 structural data element S ;

26 applying algorithm A and alphabet AV to structural data element S
27 to form a plurality of logical scales of position coding;

28 forming a transformed structural data element S' comprised of a
29 sequence of the logical scales of position coding;

30 stochastically selecting a bit length parameter and a shift parameter

1 which define an internal identifier K within transformed
 2 structural data element S' ;
 3 forming tag data element T ;
 4 coding a portion of the tag data element T with internal identifier K
 5 to obtain a partially coded tag data element T' ;
 6 selecting an external key K^x ;
 7 coding the partially coded tag data element T' with external key
 8 K^x to obtain coded tag data element T'' ;
 9 stochastically determining whether to extract internal identifier K
 10 from transformed structural data element S' , and if
 11 determined necessary, extracting the internal identifier K
 12 from transformed structural data element S' to obtain
 13 structural data element S'' and storing internal identifier K
 14 in a file of internal identifiers FID ;
 15 performing the steps of the conversion function upon a converted
 16 image M' comprised of a concatenation of the coded tag
 17 data element T'' and either transformed structural data
 18 element S' if internal identifier K was not extracted, or
 19 structural data element S'' if internal identifier K was
 20 extracted;
 21
 22 and forming the encrypted final image G as a concatenation of the coded tag
 23 data element T'' and either transformed structural data element S' if internal
 24 identifier K was not extracted, or structural data element S'' if internal
 25 identifier K was extracted.

26
 27 64. The apparatus of claim 63, wherein:

28
 29 the processor is adapted to communicate on a network; and
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1 the computer executable process steps further comprise:
2
3 structurally converting the file of internal identifiers FID to obtain a
4 converted file of internal identifiers FID' , wherein a tag data
5 element formed during the structural conversion of the file of
6 internal identifiers FID is coded with an external key selected
7 stochastically from a multitude of external keys in an external key
8 file K_{EXT} ; and
9 transmitting the encrypted final image G and structurally converted file of
10 internal identifiers FID' to a subscriber or receiver.

11
12 65. An apparatus for structurally converting a binary sequence into an encrypted final
13 image G , comprising:

14
15 a memory element for storing computer executable process steps;

16
17 a processor for executing computer executable process steps;
18 computer executable process steps comprising:

19
20 forming an image M of the binary sequence as a concatenation of a tag
21 data element T and structural data element S , tag data element T
22 comprising information necessary to reverse the conversion process,
23 structural data element S comprising a sequence of logical scales of
24 position coding;

25
26 selecting a number of conversion steps P to be performed;

27
28 iteratively executing P times a conversion function comprised of the
29 following steps:

30

1 selecting a transformation algorithm A from a predefined set of
 2 transformation algorithms L ;
 3 selecting an alphabet of transformation AV based upon the
 4 structural data element S ;
 5 applying algorithm A and alphabet AV to structural data element S
 6 to form a plurality of logical scales of position coding;
 7 forming a transformed structural data element S' comprised of a
 8 sequence of the logical scales of position coding;
 9 stochastically selecting a bit length parameter and a shift parameter
 10 which define an internal identifier K within transformed
 11 structural data element S' ;
 12 scrambling internal identifier K with a scrambling function to
 13 obtain a scrambled internal identifier K' ;
 14 forming tag data element T ;
 15 coding a portion of the tag data element T with scrambled internal
 16 identifier K' to obtain a partially coded tag data element T' ;
 17 selecting an external key K^x ;
 18 coding the partially coded tag data element T' with external key
 19 K^x to obtain coded tag data element T'' ;
 20 stochastically determining whether to extract internal identifier K
 21 from transformed structural data element S' , and if
 22 determined necessary, extracting the internal identifier K
 23 from transformed structural data element S' to obtain
 24 structural data element S'' and storing scrambled internal
 25 identifier K' in a file of internal identifiers FID ;
 26 performing the steps of the conversion function upon a converted
 27 image M' comprised of a concatenation of the coded tag
 28 data element T'' and either transformed structural data
 29 element S' if internal identifier K was not extracted, or

1 structural data element S'' if internal identifier K was
2 extracted;
3 and forming the encrypted final image G as a concatenation of the coded
4 tag data element T'' and either transformed structural data element S' if
5 internal identifier K was not extracted, or structural data element S'' if
6 internal identifier K was extracted.
7
8 66. The apparatus of claim 65, wherein:
9
10 the processor is adapted to communicate on a network; and
11
12 the computer executable process steps further comprise:
13 structurally converting the file of internal identifiers FID to obtain a
14 converted file of internal identifiers FID' , wherein a tag data
15 element formed during the structural conversion of the file of
16 internal identifiers FID is coded with an external key selected
17 stochastically from a multitude of external keys in an external key
18 file K_{EXT} ; and
19 transmitting the encrypted final image G and structurally converted file of
20 internal identifiers FID' to a subscriber or receiver.
21
22 67. The apparatus of claim 62, wherein the external key K^x is selected from a
23 multitude of external keys in an external key file K_{EXT} .
24
25 68. The apparatus of claim 62, wherein the selection of external key K^x is a stochastic
26 selection.
27
28 69. The apparatus of claim 62, wherein a same external key K^x is selected for use in
29 all iterations.
30

- 1 70. The apparatus of claim 62, wherein a different external key K^x is selected upon
2 each iteration.
3
- 4 71. The apparatus of claim 62, wherein the external key K^x is entered by a user during
5 the conversion and reverse conversion process.
6
- 7 72. The apparatus of claim 67, wherein:
8
9 the processor is adapted to communicate on a network; and
10
11 the computer executable process steps further comprise:
12 structurally converting the external key file K_{EXT} to obtain a structurally
13 converted external key file; and
14 transmitting to a subscriber the structurally converted external key file and
15 an initial key K_{INIT} required to reverse the structural conversion of
16 the structurally converted external key file to obtain the external
17 key file K_{EXT} .
18
- 19 73. The apparatus of claim 62, wherein the selection of transformation algorithm A
20 may be a stochastic selection.
21
- 22 74. The apparatus of claim 62, wherein the selection of transformation algorithm A
23 may depend upon adherence to a mathematical criterion.
24
- 25 75. The apparatus of claim 62, wherein the selection of transformation algorithm A
26 may depend upon adherence to a logical criterion.
27
- 28 76. The apparatus of claim 62, wherein the selection of transformation algorithm A
29 may depend upon adherence to a file size criteria for encrypted final image G .
30

- 1 77. The apparatus of claim 62, wherein the predefined set of transformation
2 algorithms L may be supplemented.
3
- 4 78. The apparatus of claim 62, wherein the selection of a number of conversion steps
5 P may be a stochastic selection.
6
- 7 79. The apparatus of claim 62, wherein the selection of a number of conversion steps
8 P may depend upon adherence to a mathematical criterion.
9
- 10 80. The apparatus of claim 62, wherein the selection of a number of conversion steps
11 P may depend upon adherence to a logical criterion.
12
- 13 81. The apparatus of claim 62, wherein the selection of a number of conversion steps
14 P may depend upon adherence to a file size criteria for encrypted final image G .
15
- 16 82. The apparatus of claim 62, wherein the alphabet of transformation AV is
17 comprised of letters or quants, each letter or quant comprising a segment of
18 structural data element S .
19
- 20 83. The apparatus of claim 82, wherein a number of bits in each letter or quant is
21 stochastically selected.
22
- 23 84. The apparatus of claim 82, wherein a number of bits in each letter or quant may
24 depend upon adherence to a mathematical criterion.
25
- 26 85. The apparatus of claim 82, wherein a number of bits in each letter or quant may
27 depend upon adherence to a logical criterion.
28
- 29 86. The apparatus of claim 82, wherein a number of bits in each letter or quant may
30 depend upon adherence to a file size criteria for encrypted final image G .

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87. The apparatus of claim 62, wherein the information necessary to reverse the conversion process stored in tag data element T may comprise one or more of the following:

- an indicator of whether a current iterative step is the P^{th} iteration;
- an indicator of whether the selected external key K^x is to be used for all P iterations;
- an indicator of the selected external key K^x ;
- an indicator of the selected transformation algorithm A ;
- a length of a first logical scale of position coding;
- the alphabet of transformation AV ; and
- other transformation algorithm A parameters.

88. The apparatus of claim 63, wherein the information necessary to reverse the conversion process stored in tag data element T may comprise one or more of the following:

- an indicator of whether a current iterative step is the P^{th} iteration;
- an indicator of whether the selected external key K^x is to be used for all P iterations;
- an indicator of the selected external key K^x ;
- an indicator of the selected transformation algorithm A ;
- the alphabet of transformation AV ;
- a length of a first logical scale of position coding;
- other transformation algorithm A parameters;
- the bit internal identifier K length and shift parameters; and
- an indicator of internal identifier K extraction.

89. The apparatus of claim 63, wherein the information necessary to reverse the conversion process stored in tag data element T may comprise one or more of the following:

1 an indicator of whether a current iterative step is the P^{th} iteration;
 2 an indicator of whether the selected external key K^x is to be used for all P
 3 iterations;
 4 an indicator of the selected external key K^x ;
 5 an indicator of the selected transformation algorithm A ;
 6 the alphabet of transformation AV ;
 7 a length of a first logical scale of position coding;
 8 other transformation algorithm A parameters;
 9 an indicator of the scrambling function selected;
 10 the bit internal identifier K length and shift parameters; and
 11 an indicator of internal identifier K extraction.

12
 13 90. The apparatus of claim 65, wherein the scrambling function is selected from a
 14 scrambling matrix comprised of a predefined set of scrambling functions.

15
 16 91. The apparatus of claim 90, wherein the predefined set of scrambling functions is
 17 changed periodically.

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